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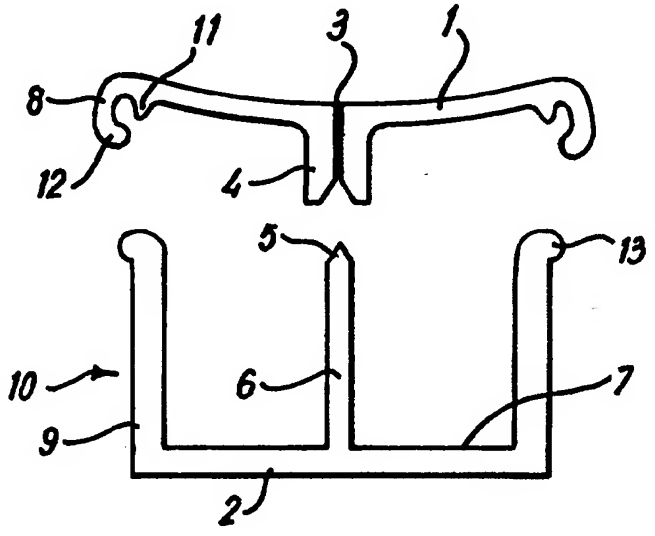
(57) Abstract

An insert (10) for releasing pressurised gas into beverage is provided by closing the insert (10) in a gas at super atmospheric pressure, gradually reducing the pressure external to the insert to atmospheric pressure, placing the insert in a container, filling the container with a beverage, sealing the container and causing the gas to escape from the insert on opening the container.



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METHOD OF PRESSURISING INSERTS

This invention relates to a method of providing a pressurised gas in an insert for release into a beverage.

It is becoming increasingly popular to provide an insert inside a beverage can in which the insert contains a pressurised gas which is released into the beverage when the can is opened.

A number of methods have been used to provide an insert with a valve means, charged with pressurised gas, positioned in a sealed beverage can.

In one method, the gas inside the insert can be charged to super-atmospheric pressure at the time of forming the insert and the insert placed in the beverage can in a super- atmospheric atmosphere. This means that there is no pressure differential across a valve of the insert; no gas will escape from the insert which would otherwise cause a lowering of the internal pressure of the insert.

This method requires major alteration to a canning line to be put into effect as a beverage can containing the charged insert must be kept at super-atmospheric pressure during filling and sealing.

A second method is to fill the insert with a gas at atmospheric pressure and to increase the pressure of the gas within the insert once it is placed and sealed within the beverage can. An increase in pressure within the insert can be produced by reduction of the volume of the insert or by means of the insert having a gas permeable wall through which gas can enter the insert from the surrounding beverage until the gas pressure within the insert is equal to the pressure of the surrounding beverage.

These two methods both have disadvantages. The first method necessitates a reduction of the speed of the canning line. The second method requires the insert either to have moving parts or to be formed of a deformable material, the deformation of which may not be uniform across a number of inserts, or to rely on a gas permeable material for transfer of the gas into the insert.

According to a first aspect, the present invention provides a method of providing a pressurised gas in an insert for release into a beverage comprising the steps of:

a) providing an insert cap and an insert body which are assemblable to form the insert, the insert cap being provided in a first state in which it has a connection portion and a resilient, substantially arcuate body portion;

b) assembling the insert body and the insert cap

together by deforming the body portion of the cap, maintaining it in a second, elastically deformed state at the insert body, and fixing the connection portion of the cap to the insert body to form the insert and to seal a gas within the insert.

According to a second aspect, the present invention provides an insert having a closable orifice for releasing a pressurised gas within a beverage container, the insert comprising an insert cap attached to an insert body in which the insert cap has a first state in which it has a connection portion and a resilient, substantially arcuate body portion and in which the cap is retained at the insert body in a second, elastically deformed state by attachment of its connection portion to the insert body to close the insert.

The method and apparatus of the present invention cannot be deduced from examination of the insert as provided in a beverage can before, during or after operation of the insert.

According to a further aspect of the present invention there is provided a method of providing a pressurised gas in an insert for release into a beverage comprising the steps of:

a) closing the insert in a gas at super-atmospheric pressure;
b) gradually reducing the pressure external to the insert to atmospheric pressure;
c) placing the insert in a container, filling the container and sealing the container; and
d) causing at least some of the gas to escape from

the insert on opening the container.

Preferably, the insert is closed by causing a projection member to block an orifice in the insert.

Preferably, the insert has a cap which is attachable to an insert body in the form of a cup member, the cap being sprung or resilient such that it will remain attached to the cup member when the insert is filled to super-atmospheric pressure.

Preferably, the cap is attachable to the cup member by means of a seal which allows variation in the shape of the cap and level of external pressure without breaking the seal.

Preferably, the projection member is attached to the cup member and the orifice is provided in the cap of the insert.

Preferably, the gas escapes through the orifice as the cap springs away from the cup member due to a sudden drop in pressure external to the insert.

Preferably, the insert is formed of a plastics material and the spring or resilience of the cap is reduced slightly during pasteurisation of the container containing the insert.

According to another aspect of the present invention there is provided a method of providing a pressurised gas in an insert for release into a beverage comprising the steps of closing a sprung or resilient cap onto a cup member to enclose a gas at a super-atmospheric pressure within the insert and subsequently reducing

the external pressure to atmospheric pressure without substantial escape of the gas from inside the insert.

Preferably, the cap contains an orifice which, when the cap is attached to the cup member, is closed by a projection member projecting from the cup member.

Preferably, the cap is sprung such that the orifice springs away from the projection member when the insert is position in a sealed, pressurised container and the pressure external to the insert is reduced suddenly to atmospheric pressure, for example, by broaching the container.

Embodiments of the present invention will now be described with reference to the accompanying drawings in which:

Fig 1 is a cross-section of the components of an insert in accordance with the present invention, before assembly;

Fig 2 is a cross-section of the insert of Fig 1 when assembled; and

Fig 3 is a cross-section of the insert of Fig 1 during operation of the insert on opening a beverage container in which the insert is disposed.

Referring to the drawings, a diagrammatic cross section of the insert 10 is shown in Fig 1. The insert has two opposing walls 1,2. The first wall 1, which is disposed at the top of the insert 10, has an orifice 3 in its centre. The orifice 3 has a surround 4 which

co-operates with a top 5 of a projection member in the form of a stem 6 which projects from an internal face 7 of the second wall 2.

The first wall 1 is in the form of a cap 8 which clips onto an insert body in the form of a cup shaped member 9 of which the second wall 2 is the base.

Prior to assembly of the cap 8 onto the cup shaped member 9, the cap 8, when not subjected to external forces, has a body portion having a curved, convex or arcuate form such that its centre, at which orifice 3 is positioned, curves inwardly in relation to the surrounding rim 12 of the cap 8.

The cap 8 is formed of a resilient material and clips onto the cup member 9 with an interference fit between the rim 12 of the cap 8 (which provides a connection portion) and the rim 13 of the cup member 9.

The insert 10 is designed such that the composite height **h1** of the projecting stem 6 and the orifice surround 4 is of greater height than the distance **h2** between the two walls 1,2 at their circumferences including the fully extended inter-locking join of the cap 8 to the cup member 9. This means that the first wall 1 is forced to curve around the stem 6 in a concave manner when the cap 8 is pressed onto the cup member 9 and the top 5 of the stem 6 is forced against the surround 4 of the orifice 3 thereby closing the orifice 3.

The resilience of the cap 8 of the insert 10 is such that the insert 10 can be assembled under a pressure of approximately 34 psi and the cap 8 forced onto the cup

member 9 enclosing the gas at a pressure of 34 psi within the insert 10.

The pressure external to the insert 10 is reduced slowly to atmospheric pressure and the resilience or spring of the cap 8 of the insert 10 is such that substantially no gas escapes from the orifice 3 even though there is a large pressure difference between the pressures inside and outside the insert 10.

It is important to ensure that the cap 8 does not pop off inadvertently due to the resilience or spring of the cap 8 not being sufficient. Alternatively, if the resilience or spring of the cap 8 is too strong, operation of the insert 10 will be impaired. The resilience of the cap 8 is determined by the dimensions of the cap and flexibility and nature of the material from which it is made.

The insert 10 is inserted into the can and the can is filled with a beverage and sealed. After sealing, the can is pasteurised. During pasteurisation the pressure of the beverage inside the can rises considerably due to the rise in temperature. The pressure inside the insert 10 also rises due to the increase in temperature of the gas; however, due to the fact that the pressure of the beverage external to the insert 10 is greater than the internal pressure of the insert 10, no gas escapes from the insert 10 during this time.

When the plastics material of which the insert is made is heated, as occurs during pasteurisation, it creeps slightly and as it is under pressure the cap 8 creeps more into the position it is held in by the external pressure in relation to the cup member 9. Due to the

creep in the plastics material, the resilience or spring of the cap 8 is weakened a little but, once cooled, the pressure external to the insert 10 is sufficient to ensure that the orifice 3 remains closed until the beverage can is opened.

When the can is cooled after pasteurisation the pressure within the insert 10 falls back to its original filling pressure of approximately 34 psi. The pressure in the beverage external to the insert 10 remains at a higher pressure enabling the cans to be transported without risk of the gas escaping from the insert 10.

When the can is opened, the pressure in the beverage surrounding the insert 10 drops suddenly to atmospheric pressure. This sudden drop in pressure causes the resilient cap 8 of the insert 10 to spring away from the stem 6 which projects from the second wall 2 of the insert 10 thus allowing some gas to escape through the orifice 3. The seal between the cap 8 and the cup member 9 must be sufficiently strong to prevent the cap 8 coming away from the cup member 9 during this decrease in external pressure. Not all the gas escapes through the orifice 3 as the cap 8 of the insert 10 quickly springs back to rest on the stem 6. This means that some pressurised gas remains in the insert 10.

Due to the fact that the operation of the insert 10 depends on the resilience or spring of the cap 8 of the insert 10, the dimensions of the cap 8 are extremely important. Also, the seal between the cap 8 and the cup member 9 of the insert 10 is very important and a slight ridge 11 on the internal circumference of the cap 8 is provided which acts against the rim 13 of the

cup member 9 holding the seal between the cap 8 and the cup member 9 together even when the cap 8 is tensioned and is curved around the stem projection 6.

This operation may vary slightly in that the base of the cup member 9 may curve outwardly as well as or in place of the cap 8.

Modifications and improvement may be made without departing from the scope of this invention.

CLAIMS

1. A method of providing a pressurised gas in an insert (10) for release into a beverage comprising the steps of:

   a) providing an insert cap(1) and an insert body (2) which are assemblable to form the insert (10), the insert cap (1) being provided in a first state in which it has a connection portion and a resilient, substantially arcuate body portion;
   b) assembling the insert body (2) and the insert cap (1) together by deforming the body portion of the cap (1), maintaining it in a second, elastically deformed state at the insert body (12), and fixing the connection portion of the cap (1) to the insert body (2) to form the insert and to seal a gas within the insert.

2. A method in accordance with Claim 1 in which the insert is assembled with an initially convex surface of the body portion of the cap (1) arranged towards the insert body.

3. A method in accordance with Claim 1 or Claim 2 in which the insert is closed by causing a projection member (6) to block an orifice (3) of the insert.

4. A method in accordance with Claim 3, in which the projection (6) member is attached to the insert body (2) and the orifice (3) is provided in the cap (1).

5. A method in accordance with any preceding claim in

which the insert body (2) is provided in the form of a cup shaped member.

6. A method in accordance with any one of Claim 3 to 5 in which the cap (1) is deformed around the projection member (6) upon being assembled with the insert body (2), the projection member (6) acting against the cap (1) to cause it to assume its second state when attached to the insert body (2).

7. A method in accordance with any preceding claim in which the insert (10) is assembled in a gas at super atmospheric pressure to seal a gas at super atmospheric pressure within the insert.

8. A method in accordance with Claim 7 in which once the insert (10) has been sealed the pressure around the insert is reduced to atmospheric pressure and the resilience of the cap (1) causes it to be retained at the insert body (2) to prevent substantial release of pressurised gas from the insert until such release is desired.

9. A method in accordance with any preceding claim comprising the further steps of:

c) placing the insert (10) in a container, filling the container with a beverage and sealing the container;

d) increasing the temperature of the insert (10) within the container.

10. A method in accordance with Claim 9 in which the temperature of the insert (10) within the container is raised by subjecting the container and the beverage therein to a pasteurisation

process.

11. A method in accordance with Claim 9 or Claim 10 in which increasing the temperature of the insert (10) causes a relaxation of the resilience of the cap (1).

12. A method in accordance with Claim 9 or Claim 10 in which increasing the temperature of the insert (10) causes plastic deformation of the cap (1).

13. A method in accordance with any one of Claims 9 to 12 in which raising the temperature of the insert (10) causes the cap (1) to assume a third, relaxed, state at which it is maintained at the insert body (2) and in which state reduction of pressure externally of the insert to substantially atmospheric pressure cause the cap (1) to deform causing gas to be released from inside the insert (10).

14. A method in accordance with any preceding claim in which the insert (10) is formed, at least in part, of the thermally modifiable plastics material.

15. An insert (10) having a closable oriface (3) for releasing a pressurised gas within a beverage container, the insert comprising an insert cap (1) attached to an insert body (2) in which the insert cap (1) has a first state in which it has a connection portion and a resilient substantially arcuate body portion and which the cap (1) is retained at the insert body (2) in a second, elastically deformed state by attachment of its connection portion to the insert body (2) to close the insert (10).

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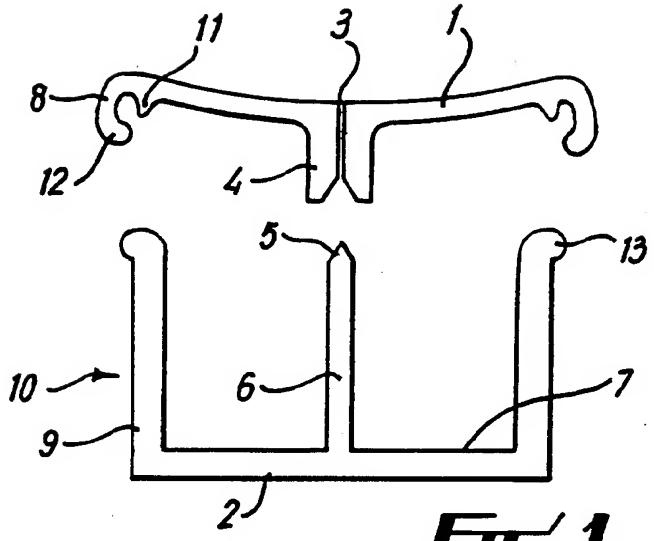

FIG. 1

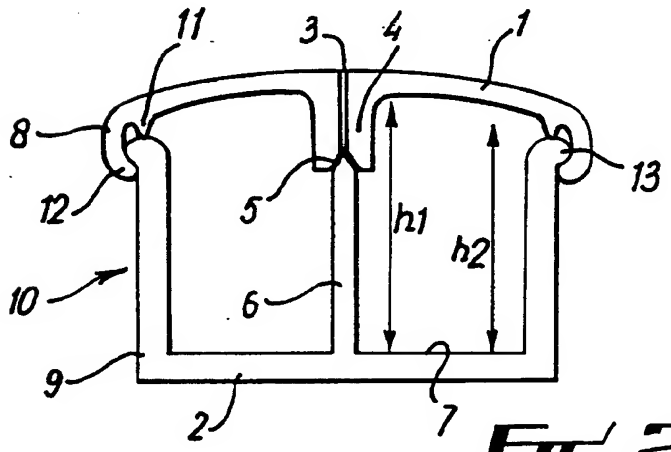

FIG. 2

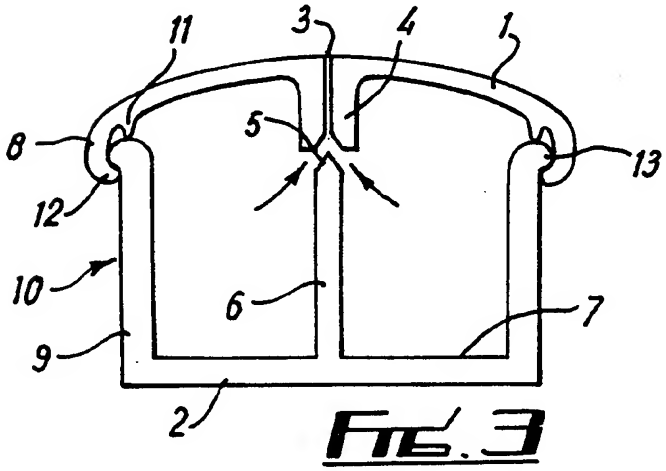

FIG. 3

INTERNATIONAL SEARCH REPORT

Int ional Application No
PCT/GB 95/01018

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65D79/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO-A-92 00896 (PRICE DEV LTD E J) 23 January 1992 see page 6, line 22 - line 34; figure 5	1-5,7, 9-11,14, 15
A,P	WO-A-95 04689 (SMITHKLINE BEECHAM PLC ;GILES GEOFFREY ALAN (GB)) 16 February 1995 see abstract; figure 1	1,15
A	EP-A-0 594 221 (WHITBREAD PLC ;HEINEKEN TECH SERVICES (NL)) 27 April 1994 see the whole document	1,15
A,P	WO,A,94 15871 (CARLSBERG TETLEY BREWERY LTD) 21 July 1994 see the whole document	1,15

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
5 September 1995	14.09.95

Name and mailing address of the ISA	Authorized officer
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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
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WO-A-9504689	16-02-95	NONE		
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		EP-A-	0502059	09-09-92
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